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May 14, 2018

VIA ELECTRONIC FILING

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: ***Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, IB Docket No. 16-408**

Dear Ms. Dortch:

In recent submissions, Telesat and OneWeb assert that the use of band segmentation to resolve inline events between NGSO FSS systems is unworkable and should be abandoned.[1] The purported technical basis for this position is laid out most clearly in an *ex parte* letter and accompanying White Paper submitted on April 10, 2018, in which Telesat and OneWeb assert that use of the six-percent ΔT/T trigger for real-time coordination purposes is infeasible because "there is no way for the operators to know the required information in advance . . . ."[2]

Attached hereto is technical analysis prepared by Viasat, which demonstrates that Telesat and OneWeb's assertion is incorrect and their technical analysis is inapposite. In short, Telesat and OneWeb mischaracterize the manner in which satellite operators would typically calculate ΔT/T and the role that "real-time" data play in such calculations. Contrary to Telesat and OneWeb's assertions, operators do not rely principally on "real-time" data to facilitate "real-time" coordination efforts. Rather, operators: (i) typically calculate increases in system noise temperature using modeled parameters; and (ii) exchange relevant model inputs well in advance, through FCC and ITU filings and during coordination discussions.

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1 *See, e.g.,* Letter from WorldVu Satellites Limited to FCC, IB Docket No. 16-408 (Apr. 18, 2018); Letter from WorldVu Satellites Limited to FCC, IB Docket No. 16-408 (Apr. 13, 2018); Letter from Telesat Canada and WorldVu Satellites Limited to FCC, IB Docket No. 16-408 (Apr. 10, 2018) ("April 10 Letter"); Letter from Telesat Canada and WorldVu Satellites Limited to FCC, IB Docket No. 16-408 (Mar. 19, 2018).

2 April 10 Letter at 2.

Consequently, even if it were infeasible for operators to exchange certain data on a real-time basis—as asserted by Telesat and OneWeb—this would be irrelevant and would not frustrate real-time coordination efforts or affect the feasibility of using band segmentation to resolve inline events.

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Respectfully submitted,

/s/ John P. Janka
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Enclosure

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Information Exchange for NGSO FSS System Coordination

The Commission's rules provide for band segmentation wherever two or more NGSO FSS systems have not been coordinated and the ΔT/T of any relevant system "exceeds 6 percent due to interference from emissions originating in the other system in a commonly authorized frequency band . . . ." Telesat and OneWeb misleadingly suggest that it is difficult for operators to determine when this 6 percent threshold has been exceeded because certain necessary information cannot be exchanged in real time in practical fashion. Although it may be difficult for operators to exchange certain types of information in real time, this is irrelevant. Any operator with coordination experience understands that ΔT/T calculations are based principally on *modeled* parameters, and that underlying models are informed by information exchanged or otherwise made available by and to operators well in advance.

The following analysis parallels and responds to the White Paper provided by Telesat and OneWeb.[1] The Telesat/OneWeb White Paper identifies certain data items as "required" in order to calculate ΔT/T at the Wanted Earth Station (in the downlink direction) and Wanted Satellite (in the uplink direction). The tables presented below recreate the "data item" lists included in the tables in the Telesat/OneWeb White Paper (with minor corrections) and identify, for each such item, the source(s) of relevant modeling data.

Downlink ΔT/T Calculation

In the downlink direction:

$$\frac{\Delta T}{T} = \frac{1}{kT} \frac{EIRP_{0\_interfering\ satellite} Gain_{wanted\ earth\ station}}{L}$$

Where k is Boltzmann's constant, T is the Wanted Earth Station's noise temperature, $EIRP_{0\_interfering\ satellite}$ is the EIRP density per Hz of the Interfering Satellite in the direction of the Wanted Earth Station, $Gain_{wanted\ earth\ station}$ is the gain of the Wanted Earth Station in the direction of the Interfering Satellite, and L is free space propagation loss between the Interfering Satellite and the Wanted Earth Station.[2]

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1 Attachment to Ex Parte filing, IB Docket No. 16-408, 10 April 2018.

2 The Telesat/OneWeb White Paper incorrectly defines the "L" parameter in the ΔT/T equation as distance, and not free space path loss. This error is particularly significant as free space path loss is proportional to distance squared (and not distance).

The Telesat/OneWeb White Paper identifies certain data items as "required" in order to calculate ΔT/T at the Wanted Earth Station. This list is recreated in Table 1, below (with certain minor corrections). Table 1 also specifies the data source(s) that can be used to derive each required data item.

Table 1 - Data items required for ΔT/T calculation at the Wanted Earth Station

Parameter		Required Data Item	Source(s) of Data
1	T	a) Inherent Noise Temperature of Wanted Earth Station	ITU-R CR notice, FCC Schedule B
2	$EIRP_0$[3]	a) Interfering Satellite ephemeris	Data provided in compliance with 25.146(e), Space Track
		b) Interfering Satellite power per Hz	FCC Schedule S, ITU-R CR notice
		c) Interfering Satellite antenna pattern	FCC Schedule S, ITU-R CR notice
		d) Interfering Satellite beam pointing	FCC Schedule S, ITU-R CR notice
3	Gain	a) Wanted Satellite ephemeris	Data provided in compliance with 25.146(e), Space Track
		b) Wanted Earth Station antenna pattern	ITU-R CR notice, FCC Schedule B
		c) Location of Wanted Earth Station	FCC Schedule B
4	L	a) Interfering Satellite ephemeris	Data provided in compliance with 25.146(e), Space Track
		b) Location of Wanted Earth Station	FCC Schedule B
		c) Transmit Frequency	FCC Schedule S, ITU-R CR notice

Uplink ΔT/T Calculation

In the uplink direction:

$$\frac{\Delta T}{T} = \frac{1}{kT} \frac{EIRP_{0\_interfering\ earth\ station} Gain_{wanted\ satellite}}{L}$$

[3] The Telesat/OneWeb White Paper incorrectly asserts that EIRP—and not EIRP *density*—is the relevant parameter.

Where k is Boltzmann's constant, T is the Wanted Satellite's noise temperature, $EIRP_{0\_interfering\ earth\ station}$ is the EIRP density per Hz of the Interfering Earth Station in the direction of the Wanted Satellite, $Gain_{wanted\ satellite}$ is the gain of the Wanted Satellite in the direction of the Interfering Earth Station, and L is free space propagation loss between the Interfering Earth Station and the Wanted Satellite.[4]

The Telesat/OneWeb White Paper identifies certain data items as "required" in order to calculate ΔT/T at the Wanted Satellite. This list is recreated in Table 2, below (with certain minor corrections). Table 2 also specifies the data source(s) that can be used to derive each required data item.

Table 2 - Data items required for ΔT/T calculation at the Wanted Satellite

Parameter		Required Data Item	Source(s) of Data
1	T	a) Inherent Noise Temperature of Wanted Satellite	FCC Schedule S, ITU-R CR notice
2	$EIRP_0$[5]	a) Interfering Satellite ephemeris	Data provided in compliance with 25.146(e), Space Track
		b) Interfering Earth Station power per Hz	FCC Schedule B, ITU-R CR notice
		c) Interfering Earth Station antenna pattern	FCC Schedule B, ITU-R CR notice
		d) Location of Interfering Earth Station pointing	FCC Schedule B
3	Gain	a) Wanted Satellite ephemeris	Data provided in compliance with 25.146(e), Space Track
		b) Wanted Satellite antenna pattern	FCC Schedule S, ITU-R CR notice
		c) Wanted Satellite beam pointing	FCC Schedule S, ITU-R CR notice
4	L	a) Wanted Satellite ephemeris	Data provided in compliance with 25.146(e), Space Track
		b) Location of Interfering Earth Station	FCC Schedule B
		c) Transmit Frequency	FCC Schedule S, ITU-R CR notice

[4] The Telesat/OneWeb White Paper incorrectly defines the "L" parameter in the ΔT/T equation as distance, and not free space path loss. This error is particularly significant as free space path loss is proportional to distance squared (and not distance).

[5] The Telesat/OneWeb White Paper incorrectly asserts that EIRP—and not EIRP *density*—is the relevant parameter.

DECLARATION

I hereby declare that I am the technically qualified person responsible for preparation of the engineering information contained in the foregoing *ex parte* presentation in IB Docket No. 16-408, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted with this pleading, and that it is complete and accurate to the best of my knowledge, information and belief.

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May 14, 2018